

Emergency Department Use by Asian American Children

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Abstract

The purpose of this study was to compare emergency department (ED) utilization and treatment patterns of Asian American children with children from other racial/ethnic groups. A cross-sectional design was used to examine all visits by children under 18 years to two urban pediatric EDs between June 2011 and May 2012. Demographic, socioeconomic, and clinical data were extracted from the patients' electronic medical records. A logistic regression model was used to assess the patients' odds of high ED utilization (at least 4 ED visits in the study period), controlling for potential confounders. The overall sample consisted of 86,922 ED visits, and over 4% were made by Asian American children. Asian Americans' ED usage and treatment patterns reflected those of Whites and not of other minority racial/ethnic groups in areas such as elopements, visit frequency, time and day of visit, time to exam, length of stay, tests ordered, inpatient admissions, and triage scores. Among all racial/ethnic groups, Asian Americans had the largest percentage of patients living in the lowest income level (45%). After adjusting for demographic, socioeconomic, and clinical covariates, Asian American children were the least likely to have high ED utilization. White patients were 2.57 (95% confidence interval 1.89 – 3.51) times more likely to have high ED utilization than Asian Americans, with all other groups having even higher odds. In conclusion, despite similar ED behaviors as Whites, Asian American children were significantly less likely to use the pediatric ED than all other racial/ethnic groups.

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Background

Disparities in emergency department (ED) use and care are prevalent for racial/ethnic minority groups in the United States (US). Racial/ethnic minorities utilize emergency medical services and present to the ED more often than Whites for both adults and children (Alpern et al., 2014; Knowlton et al., 2013; Kroner, Hoffmann, & Brousseau, 2010; LeDuc, Rosebrook, Rannie, & Gao, 2006; Rasooly, Mullins, Alpern, & Pines, 2014). Children from minority racial/ethnic groups are more likely than White children to leave the ED before being seen by a provider (Harrison, Finkelstein, Puumala, & Payne, 2012), and they have significantly longer ED wait times (Goodacre & Webster, 2005; James, Bourgeois, & Shannon, 2005; Park, Lee, & Epstein, 2009). Further, African Americans receive less urgent triage scores than White patients who present to the ED with identical complaints (Schrader & Lewis, 2013).

Racial/ethnic minorities are more likely to present to the ED with less severe issues (Hong, Baumann, & Boudreaux, 2007; Kubicek et al., 2012), which may be related to the disparities in ED triage scores (Gaucher, Bailey, & Gravel, 2011) and wait times (Goldman, Macpherson, Schuh, Mulligan, & Pirie, 2005). However, low severity cannot explain all of these differences. When presenting with chest pain, a serious complaint which should be triaged urgently (Gilboy, Tanabe, Travers, & Rosenau, 2011), both adults and children from minority racial/ethnic groups were less likely to receive a high severity triage score or have additional tests ordered compared to their White counterparts (Hambrook, Kimball, Khoury, & Cnota, 2010; Lopez, Wilper, Cervantes, Betancourt, & Green, 2010). Additional studies within specific diagnostic groups show lower odds of laboratory and radiological testing for minority racial/ethnic groups

compared to Whites, even in a pediatric care setting (Payne & Puumala, 2013). It is clear that racial/ethnic disparities exist in multiple aspects of ED treatment.

A major confounding issue in assessing racial/ethnic health disparities is the influence of socioeconomic factors, such as income, employment status, and education, on health care access and utilization. Minority racial/ethnic groups report lower education and income levels, and they are less likely to have a usual source of medical care than Whites (Flores & Tomany-Korman, 2008; Flores & Lin, 2013). Further, public insurance is frequently used in the ED literature to indicate low socioeconomic status (Harrison et al., 2012; Kroner et al., 2010; LeDuc et al., 2006; Park et al., 2009), and it is also associated with lower severity ED presentations (Becker et al., 2013; Tang, Stein, Hsia, Maselli, & Gonzales, 2010) and high ED visit frequency (Gindi & Jones, 2014). Due to the socioeconomic disparity between racial/ethnic groups in the US (Flores & Tomany-Korman, 2008; Flores & Lin, 2013), it is difficult to assess racial/ethnic differences in care without considering the effects of socioeconomic factors.

Families with limited financial resources are more likely to face transportation (Call et al., 2014; Thomas & Wedel, 2014) and employment (Flores & Tomany-Korman, 2008) barriers that may prevent them from seeking health care during daytime business hours. These barriers may explain why low income families are less likely to have a primary care provider (Willems et al., 2013) and more likely to visit the ED (Dy et al., 2014; Largent, Nickerson, Cooper, & Delfino, 2012) than those with higher income. In fact, one study found that racial/ethnic disparities in frequent ED use were eliminated when accounting for insurance, income, employment status, and education (Hong et al., 2007). Collecting more income-related data in ED research studies would allow

researchers to compare racial/ethnic groups without the confounding effect of socioeconomics. This may lead to a decrease in the observed disparities in ED care between racial/ethnic groups. Unfortunately, most of the current ED disparity research is limited to medical record or administrative data and does not often include many socioeconomic variables.

Gap in Literature

Although racial/ethnic health disparities have been documented for African Americans, Hispanics, and American Indians (Harrison et al., 2012; James et al., 2005; Schrader & Lewis, 2013), few studies have separately analyzed health care utilization and access for Asian Americans (Ghosh, 2003). This is especially noteworthy, as Asian Americans have recently been the fastest growing minority group in the US, with 46% population growth between the years 2000 and 2010 (*Asian/Pacific American heritage month: May 2013*, 2013; Hoeffel, Rastogi, Kim, & Shahid, 2012). In 2010, Asian Americans had a poverty rate of 12%, a median household income of \$64,308, and 18% were without health insurance (DeNavas-Walt, Proctor, & Smith, 2011). In comparison, African Americans and Hispanics both had poverty rates over 26%, median household incomes less than \$38,000, and more than 20% lacked health insurance (DeNavas-Walt et al., 2011). Asian Americans represent a socioeconomically unique minority racial/ethnic group, and thus, they may also have unique patterns of ED utilization and treatment.

Existing research on Asian American health care utilization is limited (Ghosh, 2010), but several recent studies support the theory that Asian Americans interact with the ED differently from other racial/ethnic minorities. Compared to White patients, Asian Americans had fewer visits to the doctor (Yu, Huang, & Singh, 2004) and ED (Flores &

Tomany-Korman, 2008; Yu, Huang, & Singh, 2010) and were less likely to have health insurance (Flores & Tomany-Korman, 2008; Yu et al., 2004). Asian Americans had lower total health care expenses, lower physician and pharmaceutical costs, but no difference in ED expenses compared to Whites (J. Chen, Vargas-Bustamante, & Ortega, 2013). In comparison to other racial/ethnic minorities, Asian Americans had higher income, insurance coverage, education, and marriage rates, and they were less likely to delay medical care due to cost barriers (Barnes, Adams, & Powell-Griner, 2008). A study of children with asthma showed that Asian Americans had the lowest hospital admission and ED visit rates, even compared to Whites and among those with a low socioeconomic status (Largent et al., 2012).

Some of these differences in health care utilization may be due to Asian-specific cultural beliefs or practices (Lakhanpaul et al., 2014). In one study, Asian mothers with an acutely ill child first used traditional medicine at home before bringing the child to a medical professional (Jintrawet & Harrigan, 2003). These women were also more likely to believe that their child's illness was caused by changes in diet, growth, development, or temperature (Jintrawet & Harrigan, 2003). In another study, Hmong American parents perceived that their child's illness was related to spiritual matters, and so they consulted faith healers rather than healthcare professionals for the child's medical care (Nuttall & Flores, 1997).

In addition, socioeconomic factors may have less of an impact on healthcare use for Asian Americans than other racial/ethnic groups. A recent study of a nationwide sample in China found that, although patients with low education had higher odds of utilizing community health services in 2008 and 2009, patients with high education were

more frequent users in 2010 and 2011 (Gong et al., 2014). The same study found that in 2011, level of income had no impact on the likelihood of patients frequently using community health services (Gong et al., 2014).

Traditional Asian culture may have different benchmarks for serious illness compared to the US healthcare system. Asian Americans report that in their countries of origin, it is more common for people to wait until they are very sick to see a healthcare provider (S. Lee et al., 2010). Among Chinese American parents who brought their child to a pediatric ED, 28% believed that their child who received a triage score of 3 or lower, indicating severe illness (Gilboy et al., 2011; Green et al., 2012), was “somewhat sick or not sick at all” (Garcia et al., 2010). In a survey of Cambodian American adults, almost 33% stated they would call a friend or family member instead of 9-1-1 in case of an emergency (Meischke et al., 2012). Finally, dissatisfaction with one’s healthcare provider may contribute to differential utilization patterns in Asian Americans. Compared to Whites, Asian Americans were more likely to report that their doctors did not understand their background or values (Call et al., 2014), and their doctors did not listen, spend enough time, or involve them in care decisions like they wanted (Ngo-Metzger, Legedza, & Phillips, 2004).

Problem

Recognizing that Asian culture may play a unique role in Asian Americans’ healthcare-seeking behaviors and attitudes, it is important to understand how this group utilizes medical resources, such as the ED. Most studies on patterns of use and care in the ED combine Asian Americans with other racial/ethnic minority groups in their analyses (Becker et al., 2013; Hargraves & Hadley, 2003; Hong et al., 2007; James et al., 2005;

Park et al., 2009) so that little is known on the habits of this group specifically.

Altogether, there appears to be a void in the medical literature regarding Asian American healthcare utilization for both children and adults (Garcia et al., 2010; Ghosh, 2003; Ghosh, 2010; Trinh-Shevrin et al., 2012).

Research Questions

This study is a secondary analysis of ED visit data collected as part of a multi-site research project funded by a grant from the National Institute on Minority Health and Health Disparities. The aim of the original study was to assess various aspects of ED care for American Indian children in the Upper Midwest. Although not the primary result, a consistent finding in this research was the differential treatment and presentation of Asian American children in the ED. These findings led one researcher to seek an explanation for the unique behavior of this group by examining the existing literature and designing a new study that focused on Asian American children.

The purpose of the present study was to compare Asian American children's ED utilization and treatment patterns to those of Whites and other minority racial/ethnic groups. The research team also aimed to study the impact of socioeconomic factors on ED utilization for Asian Americans compared to other racial/ethnic groups in a pediatric care setting. The primary hypothesis was that Asian American children would exhibit ED utilization and treatment patterns more similar to White children than to children from other minority racial/ethnic groups. In addition, the researchers hypothesized that Asian American children would have the lowest ED utilization among all racial/ethnic groups when accounting for demographic, socioeconomic, and clinical factors.

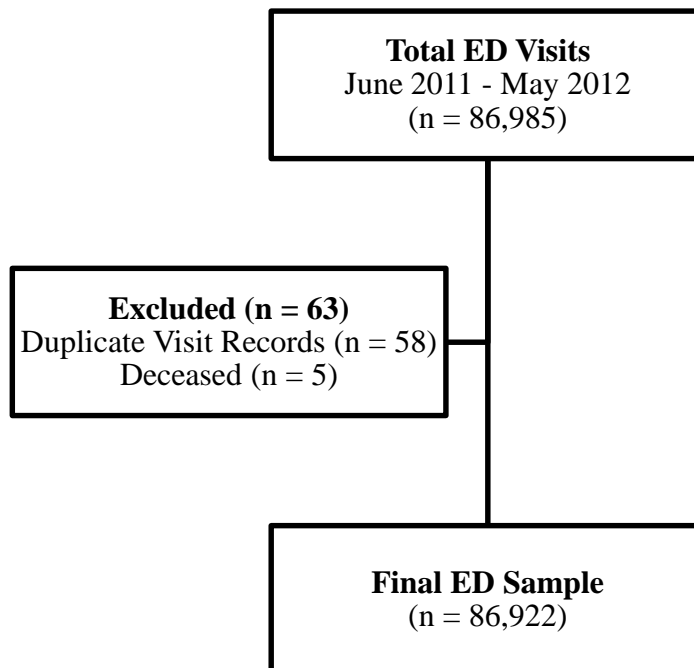
Methods

Study Design and Sample

This cross-sectional study examined all visits by children less than 18 years old to two urban pediatric EDs in Minnesota from June 1, 2011 to May 31, 2012. Researchers electronically extracted data from each hospital's medical records and then sent it to a central data collection site where research staff cleaned, de-identified, and merged the data into a single database. Duplicate ED visit records were identified and excluded from the final sample (Figure 1). Visits were also excluded for patients who died (Figure 1). This study was approved by the Institutional Review Boards at Children's Hospitals and Clinics of Minnesota and the University of Minnesota.

Figure 1

Flow Diagram of Study Sample



Outcome Measures

The primary outcome measures were ED utilization and treatment variables by Asian American children compared to other racial/ethnic groups. ED utilization measures were chosen based on their use in previous health disparity studies, and they included: median financial charge per visit, median time between ED visits, elopements, visit frequency, and time and day of visit (Dy et al., 2014; Harrison et al., 2012; Henneman, Nathanson, Ribeiro, & Balasubramanian, 2014; LeDuc et al., 2006). The following ED treatment measures were also chosen based on their use in previous health disparity research: median time to exam, median length of stay, ordering laboratory or radiological tests, inpatient admissions, and triage scores (Hambrook et al., 2010; Karaca & Wong, 2013; Payne & Puumala, 2013; Schrader & Lewis, 2013). Financial charges were taken directly from the medical record. Time between ED visits was defined as the total number of days between one visit and the next by the same patient within the study period. Elopement describes patients who registered in the ED waiting room and were assessed by a triage nurse, but then left the ED before being seen by a physician (Handel et al., 2010; Timm, Ho, & Luria, 2008). Visit frequency was categorized as less than 4 visits or greater than or equal to 4 visits for each patient in the study period, a measure which is often used in ED utilization studies (Hardie et al., 2013; Neuman et al., 2014; Sun, Burstin, & Brennan, 2003). For this study, time of visit was categorized as “daytime” (6:00 AM to 5:59 PM) or “nighttime” (6:00 PM to 5:59 AM), and day of visit was categorized as “weekday” (Monday through Friday) or “weekend” (Saturday and Sunday).

Time to exam, length of stay, laboratory or radiological test orders, inpatient admissions, and triage scores were abstracted from the electronic medical record. Patients received a triage score during each ED visit using the Emergency Severity Index, version 4 (Gilboy et al., 2011; Green et al., 2012; Tanabe, Gimbel, Yarnold, Kyriacou, & Adams, 2004) (ESI) tool, in which the triage nurse would code each patient using a scale ranging from 1 (most urgent) to 5 (least urgent) based on the severity of the patient's symptoms and their anticipated resource utilization. The socioeconomic variables of insurance type, distance between patient residence and the ED, and estimated household income were assigned according to typologies previously established in the racial/ethnic health disparity literature (Berkowitz, Traore, Singer, & Atlas, 2014; Flores & Tomany-Korman, 2008; Hong et al., 2007; Lorch, Silber, Even-Shoshan, & Millman, 2009).

Demographic, insurance, and clinical data were electronically extracted from medical records and used in bivariate and multivariate analyses. Racial/ethnic group was self-reported at registration in the ED. The racial/ethnic classifications of “Asian” and “Pacific Islander” were combined into one group and categorized as “Asian American” for the analyses. Insurance type was categorized as “private” or “public.” Prepaid Medical Assistance plans and self-pay patients were included in the public insurance category. Distance between the patient’s residence and the ED was calculated from the center of the patient’s zip code to the ED at which the patient sought care. Patients were assigned the median income for the zip code in which they resided (Berkowitz et al., 2014) using Truven Health Analytics data. Median incomes were grouped into quartiles and defined as “high” (\$68,377 - \$103,309), “moderately high” (\$49,849 – \$67,952),

“moderately low” (\$40,193 - \$49,792), and “low” (\$14,524 - \$40,094) based solely on the sample data (Berkowitz et al., 2014).

Statistical Analysis

Chi square tests were utilized to assess bivariate associations between racial/ethnic group and ED utilization, treatment, and socioeconomic variables. The primary outcome variable of visit frequency was used to represent ED utilization. The researchers utilized a logistic regression model to assess the influence of demographic, socioeconomic, and clinical variables on ED utilization, and patients were dichotomized into those with fewer than 4 ED visits vs. those with at least 4 ED visits in the study period. Within the logistic regression model, six dummy variables categorized the racial/ethnic group of patients as Asian American, White, African American, Hispanic, American Indian, or Other. Potential covariates were selected based on a hypothesized association with ED utilization and a significant association with ED utilization in bivariate analyses ($p < 0.05$). The researchers developed a pair-wise correlation matrix to identify correlated variables, and covariates with a correlation coefficient ≥ 0.60 were not included in the same model (Allison, 2015). The final logistic regression model assessed the odds that an ED visit was made by a patient with at least 4 visits in the study period, adjusting for: racial/ethnic group, income level, insurance type, distance from patient residence to the ED, age, primary language, sex, and hospital. The model was adjusted for clustering of visits within each patient. Statistical analyses were performed using Stata version 13.1.

Results

Demographics

The sample included 86,922 total ED visits by 56,175 patients. Over 4% of the visits were made by Asian American children, with a majority of the sample consisting of Whites (34%) and African Americans (30%). Asian Americans had the highest percentage of visits among children less than 1 year old (24%) and one of the lowest percentages of visits by adolescents (11-17 years old, 13%) (Table 1). This group also had the highest percentage of male patients and the second highest percentage of non-English speakers (Table 1). A strong majority (74%) of Asian American patients visited hospital site 2, which reflects the demographic distribution of patients around each hospital (Table 1).

Table 1*Patient Demographics*

Patient Characteristics	Asian American	White	African American	Hispanic	American Indian	Other	Overall
	4.4% (n=3799)	33.8% (n=29,349)	30.2% (n=26,281)	15.8% (n=13,740)	1.7% (n=1433)	14.2% (n=12,320)	100.0% (n=86,922)
Age*							
< 1 Year	23.6%	17.1%	17.6%	16.2%	20.0%	21.3%	18.0%
1 - 4 Years	43.5%	36.2%	42.8%	43.6%	36.7%	42.9%	40.7%
5 - 10 Years	20.0%	25.3%	24.9%	28.6%	25.6%	22.6%	25.1%
11 - 17 Years	12.9%	21.4%	14.8%	11.6%	17.7%	13.3%	16.3%
Primary Language*							
English	54.9%	99.4%	69.9%	26.5%	97.6%	87.8%	75.3%
Spanish	0.2%	0.1%	0.0%	73.5%	1.0%	2.3%	12.0%
Other	44.9%	0.5%	30.1%	0.1%	1.5%	9.9%	12.7%
Sex*							
Female	42.9%	46.1%	47.0%	46.7%	51.3%	47.0%	46.5%
Male	57.1%	53.9%	53.0%	53.3%	48.7%	53.0%	53.5%
Hospital*							
Site 1	26.0%	45.2%	60.5%	60.1%	74.7%	53.0%	52.9%
Site 2	74.0%	54.8%	39.5%	39.9%	25.3%	47.0%	47.1%

* $p < 0.001$

Emergency Department Utilization

Asian American patients' use of the ED was similar to White patients and different from other minority racial/ethnic groups in several areas. Aside from Whites, Asian Americans had the highest median financial charge per ED visit (\$54.20 less than Whites). This charge was \$139 more than the next highest median charge (for "Others") and \$182.90 more than the lowest median charge (for Hispanics, Table 2). Asian Americans and Whites had the same percentage of elopements, which was lower than all other racial/ethnic groups (Table 2). These two groups also had an equal distribution of daytime *vs.* nighttime visits (50% each, Table 2). About 70% of visits across all racial/ethnic groups were made on a weekday, with a slightly higher percentage for American Indians (75%, Table 2). Hispanics had the highest median number of days between ED visits, and Asian Americans had the second highest (51 and 50 days, respectively). Both of these groups had a longer median time between visits than White patients (43 days, Table 2). Asian American children visited the ED significantly less often than all other racial/ethnic groups ($p < 0.001$, Table 2).

Table 2*Emergency Department Utilization Patterns by Racial/Ethnic Group*

Utilization Categories	Asian American	White	African American	Hispanic	American Indian	Other	Overall
	4.4% (n=3799)	33.8% (n=29,349)	30.2% (n=26,281)	15.8% (n=13,740)	1.7% (n=1433)	14.2% (n=12,320)	100.0% (n=86,922)
Financial Charge^a	\$991.00	\$1,045.20	\$818.00	\$808.10	\$810.60	\$852.00	\$894.50
Time Between Visits^b	50	43	49	51	44	46	49
Elopements*	1.3%	1.3%	1.9%	1.5%	3.0%	2.5%	1.7%
Visit Frequency*							
< 4 Visits	92.9%	89.9%	71.8%	73.4%	71.9%	79.9%	80.2%
≥ 4 Visits	7.1%	10.1%	28.2%	26.6%	28.1%	20.1%	19.8%
Time of Visit*							
Daytime	50.0%	50.0%	53.5%	52.1%	48.2%	51.7%	51.6%
Nighttime	50.0%	50.0%	46.5%	47.9%	51.8%	48.3%	48.4%
Day of Visit*							
Weekday	70.4%	68.8%	70.9%	70.6%	74.8%	69.9%	70.1%
Weekend	29.6%	31.2%	29.1%	29.4%	25.2%	30.1%	30.0%

^aMedian charge per ED visit.^bMedian number of days between ED visits per patient.**p* < 0.001

Emergency Department Treatment

Similar to ED utilization, Asian Americans' treatment in the ED often reflected that of White patients and differed from other minority racial/ethnic groups. Once they were placed in an ED examination room, Asian Americans had the shortest median wait time to see a provider (25 minutes), followed closely by Whites (26 minutes, Table 3). They also exhibited the second longest median ED length of stay (124 minutes), which was almost as long as that of White children (128 minutes, Table 3). Overall, Asian Americans and Whites received a laboratory or radiology test for 8-12% more ED visits than other racial/ethnic groups (Table 3). Further, Asian American and White children had significantly more hospital admissions than other patients ($p < 0.001$, Table 3). In regards to triage scores, Asian Americans and Whites had a higher percentage of visits in ESI levels 1-3 (indicating higher severity and more anticipated resource utilization) compared to the other racial/ethnic groups (Table 3).

Table 3*Emergency Department Treatment Patterns by Racial/Ethnic Group*

Treatment Categories	Asian American 4.4% (n=3799)	White 33.8% (n=29,349)	African American 30.2% (n=26,281)	Hispanic 15.8% (n=13,740)	American Indian 1.7% (n=1433)	Other 14.2% (n=12,320)	Overall 100.0% (n=86,922)
Time to Exam^a	25	26	30	32	30	28	28
Length of Stay^a	124	128	110	113	109	113	117
Tests Ordered^{b*}	62.7%	62.8%	51.2%	54.7%	51.9%	52.8%	56.4%
Admissions[*]	18.6%	20.5%	7.6%	6.6%	9.6%	10.8%	12.8%
Triage Scores^{c*}							
Level 1	0.6%	0.6%	0.3%	0.2%	0.5%	0.4%	0.4%
Level 2	14.3%	16.8%	7.4%	5.2%	7.6%	9.6%	10.8%
Level 3	35.2%	41.1%	26.3%	25.8%	29.0%	30.9%	32.3%
Level 4	40.1%	35.2%	45.1%	48.2%	43.5%	42.9%	41.7%
Level 5	9.9%	6.3%	20.9%	20.6%	19.5%	16.2%	14.7%

^aMedian time in minutes.^bIndicates if any laboratory or radiology tests were ordered during the ED visit.^cLevel 1 indicates the highest severity and Level 5 indicates the lowest severity visits.^{*} $p < 0.001$

Socioeconomic Factors

When comparing socioeconomic factors across racial/ethnic groups, Asian Americans stood out as having characteristics unique from both Whites and other minority racial/ethnic groups. Although Asian Americans reflected the trend of other minority racial/ethnic groups in having more patients with public insurance than private insurance, they were the only group with a distribution of almost 50% of patients in each category (Table 4). Furthermore, 62% of Asian American families traveled over 5 miles to reach the ED, second only to Whites (74%) and varying greatly from other minority racial/ethnic groups (28-49%, Table 4). Perhaps the most unique socioeconomic factor for Asian Americans was the distribution in income levels. Nearly half (45%) of all pediatric ED visits by Asian Americans were from families living in the lowest income quartile (zip code median income \leq \$40,094), which was more than all other racial/ethnic groups (Table 4). In comparison, only 8% of White patients came from that same income level.

Table 4*Socioeconomic Patterns by Racial/Ethnic Group*

Socioeconomic Categories	Asian American	White	African American	Hispanic	American Indian	Other	Overall
	4.4% (n=3799)	33.8% (n=29,349)	30.2% (n=26,281)	15.8% (n=13,740)	1.7% (n=1433)	14.2% (n=12,320)	100.0% (n=86,922)
Insurance Type*							
Private	43.1%	73.6%	13.1%	14.0%	14.8%	32.1%	37.7%
Public	56.9%	26.4%	86.9%	86.0%	85.2%	67.9%	62.3%
Distance from ED^a*							
≤ 5 Miles	37.8%	26.4%	60.0%	63.1%	72.4%	51.2%	47.1%
> 5 Miles	62.2%	73.6%	40.0%	36.9%	27.7%	48.8%	52.9%
Income Level*							
High	18.0%	41.6%	8.7%	7.4%	4.4%	16.7%	21.0%
Moderately High	16.7%	33.6%	16.5%	20.0%	16.9%	24.6%	24.0%
Moderately Low	19.8%	16.8%	37.4%	44.8%	37.7%	33.2%	30.3%
Low	45.4%	8.0%	37.4%	27.8%	41.0%	25.4%	24.7%

^aDistance from the patient's residence to the ED.* $p < 0.001$

Impact of Socioeconomic Factors on Emergency Department Utilization

After controlling for various demographic, socioeconomic, and clinical variables, all racial/ethnic groups had significantly higher odds of high ED utilization (at least 4 ED visits in 12 months) than Asian American children (Table 5). Whites had the lowest adjusted odds ratio (aOR) at 2.57 (95% confidence interval [CI] 1.89 – 3.51), indicating that White children were still more than twice as likely to have high ED utilization as Asian Americans. Consistent with previous literature (Dy et al., 2014; Gindi & Jones, 2014; Willems et al., 2013), this study found that visits by patients with lower income levels, public insurance, and living within 5 miles of the ED were more likely to have high ED utilization (Table 5). Visits by patients whose primary language was Spanish had significantly lower odds of high ED utilization compared to those with a primary language of English, but no differences were detected between primary languages of English and “Other” (Table 5). In addition, patients less than 1 year old were the most likely to have high ED utilization (Table 5).

Table 5*Odds Ratios of High Emergency Department Utilization*

Patient Characteristics	aOR (95% CI)
Racial/Ethnic Group	
Asian American	Referent
White	2.57 (1.89 - 3.51)***
African American	4.23 (3.16 - 5.66)***
Hispanic	4.76 (3.43 - 6.61)***
American Indian	4.13 (2.80 - 6.10)***
Other	3.22 (2.37 - 4.37)***
Income Level	
High	Referent
Moderately High	1.33 (1.14 - 1.53)***
Moderately Low	1.45 (1.25 - 1.68)***
Low	1.51 (1.30 - 1.76)***
Insurance Type	
Private	Referent
Public	2.75 (2.46 - 3.07)***
Distance from ED	
> 5 Miles	Referent
≤ 5 Miles	1.12 (1.03 - 1.22)**
Age	
< 1 Year	Referent
1 - 4 Years	0.78 (0.71 - 0.84)***
5 - 10 Years	0.37 (0.33 - 0.42)***
11 - 17 Years	0.44 (0.38 - 0.50)***
Primary Language	
English	Referent
Spanish	0.77 (0.65 - 0.92)**
Other	1.01 (0.90 - 1.13)
Sex	
Female	Referent
Male	1.06 (0.98 - 1.14)
Hospital	
Site 1	Referent
Site 2	0.92 (0.85 - 1.00)*

Note: Shows the adjusted odds ratio (aOR) and 95% confidence interval (CI) that an ED visit was made by a patient with at least 4 visits in the study period, controlling for: racial/ethnic group, income level, insurance type, distance from patient residence to the ED, age, primary language, sex, and hospital.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion

The results from this study demonstrate that Asian American children use the ED less frequently than White children and other racial/ethnic minorities after controlling for racial/ethnic group, income level, insurance type, distance from patient residence to the ED, age, primary language, sex, and hospital. In support of the primary hypothesis, bivariate analyses revealed that the ED treatment and utilization patterns of Asian American children were similar to Whites (Tables 2-3), although a significantly larger proportion of Asian American children had public insurance and lived in low income areas (Table 4). The results also supported the secondary hypothesis, that is, after adjusting for demographic, socioeconomic, and clinical factors, Asian American children had significantly fewer ED visits than all other racial/ethnic groups including Whites (Table 5).

There are a variety of possible explanations for the low ED utilization by Asian American children. First, Asian Americans are often more likely than other racial/ethnic groups to use Complementary and Alternative Medicine (CAM) before or instead of seeing a medical professional (Hsiao et al., 2006; Jintrawet & Harrigan, 2003; Lakhanpaul et al., 2014; S. Lee et al., 2010; Li, Quinn, McCulloch, Jacobs, & Chan, 2004). Despite their income or education level, CAM users are more likely to visit an outpatient physician than patients who do not use CAM (Li et al., 2004), and these increased outpatient visits may lead to a lower dependence on the ED for care. Furthermore, Asian Americans may be less comfortable discussing their medical problems (Berkman & Ko, 2009; J. A. Chen, Hung, Parkin, Fava, & Yeung, 2014) or adhering to medications (dela Cruz & Galang, 2008; Smeeton, Rona, Gregory, White, &

Morgan, 2007) than other racial/ethnic groups, potentially due to Asian-specific cultural values or mistrust in their healthcare providers (Thorburn, Kue, Keon, & Lo, 2012). These views may lead them to choose not to visit the ED for circumstances in which members of other racial/ethnic groups would seek care.

Immigration status is another important factor that may influence healthcare behaviors and ED use for Asian American families. As of 2013, Asians were the largest incoming immigrant group in the US (Taylor et al., 2013), and US immigrant children are much less likely than US-born children to visit the ED, have health insurance, see a doctor, or have a usual source of healthcare (Huang, Yu, & Ledskey, 2006). Recent immigrants are more likely to use ethnic-specific CAM providers vs. other healthcare services compared to those who have lived in the US longer (J. H. Lee, Goldstein, Brown, & Ballard-Barbash, 2010). Some research has shown that undocumented Hispanic immigrants fear that ED staff will discover their illegal status and report them to the government (Maldonado, Rodriguez, Torres, Flores, & Lovato, 2013), which could be true of Asian immigrants as well. This fear may prevent them from using the ED, even for serious medical conditions. Poor English language skills may also be a motivator for Asian immigrants to avoid the ED and use traditional medicine in its place (Shibusawa & Mui, 2010).

One additional explanation for the lower rates of ED use by Asian American children could be that these children are, in fact, healthier than children from other racial/ethnic groups. Asian American children are more likely to take dietary supplements and vitamins than children from other minority racial/ethnic groups (Dwyer et al., 2013). Moreover, a 2014 study found that Asian American adults had better physical health and

health behaviors than all other racial/ethnic groups, including Whites, even when accounting for educational attainment and income level (Nguyen, Moser, & Chou, 2014). In another study, older Asian American adults reported healthier food behaviors than other racial/ethnic groups (Wunderlich, Brusca, Johnson-Austin, Bai, & O'Malley, 2012). It is highly likely that these healthy physical habits and eating behaviors are taught to their children and grandchildren, leading to lower chances of sickness and injury and decreased ED utilization.

Limitations

This study has several limitations. First, the data came from only two pediatric EDs in Minnesota, and results from other areas may differ. The data contained a relatively low number of Asian American visits compared to most other racial/ethnic groups in the sample. However, the sample of Asian Americans was larger than many previous studies involving this population. Next, the covariates were limited to those that could be electronically extracted from the medical record. Since income was not captured in the medical record, publicly available zip code median incomes were used to estimate household income. This method might introduce bias due to the variability of individuals within a zip code. The medical record also did not capture the specific cultural identities of the Asian American patients. Healthcare utilization patterns differ within Asian cultural groups (Chang & Chan, 2015), and these results may primarily reflect the patterns of the largest group represented in the sample. Future studies should identify subjects' specific cultural and ethnic backgrounds. Finally, the researchers were unable to collect any qualitative data due to the nature of the study, so they could not follow up with the parents on their reasons for visiting the ED. In the future, the researchers suggest

using a prospective study design with a qualitative component to further explore the issues raised in this paper.

An additional concern with this study is that some of the covariates used, particularly income level, may vary greatly between racial/ethnic groups. Since the income categories in this study were calculated based on the overall sample, they might more accurately reflect the income levels of the larger racial/ethnic groups, such as Whites. Since Asian Americans make up only 4% of the sample, their actual income levels may not be clearly represented. While one strategy could involve running separate logistic regression models to determine how income influences ED utilization for each racial/ethnic group, it is inadvisable to compare the results from separate logistic regression models because of the unobserved heterogeneity within each model (Mood, 2009). Therefore, the researchers suggest that future studies on this topic collect income level data directly from the subject, rather than use income estimates.

Conclusion

Among a diverse sample of pediatric ED patients, Asian Americans' ED utilization and treatment patterns were more similar to Whites than to children from other racial/ethnic minority groups. Furthermore, Asian American children were significantly less likely to use the pediatric ED than all other racial/ethnic groups, even when accounting for socioeconomic variables such as income level, insurance type, and distance between patient residence and the ED. These findings suggest the potential existence of barriers which may prevent Asian American families from using the ED. Barriers may include a preference for CAM over other healthcare providers, an aversion to discussing medical problems or using medications, or immigration-related issues.

Alternatively, Asian American children may simply have fewer medical concerns than children from other racial/ethnic groups.

One implication of these barriers is that Asian American children may present to primary care clinics with higher severity issues in place of visiting the ED. As a result they may require an especially high number of primary care resources, such as laboratory tests, radiological tests, prescriptions, or referrals to outside specialists. When Asian American families do visit the ED, providers need to be sensitive to the possibility that the patient may be more likely to have an urgent medical concern. While keeping cultural preferences in mind, physicians are encouraged to educate Asian American families about health warning signs and to provide guidelines on when to use the ED if they suspect barriers may be preventing the child from receiving appropriate emergency care.

These implications remain speculative, since few studies have focused on Asian American ED behaviors. As the Asian American population continues to grow, it is becoming increasingly important to understand how families utilize the ED and other healthcare services. Therefore, the researchers recommend future studies on Asian American ED utilization to further investigate these crucial issues.

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